

Modeling paleotsunamis in Puget Sound, Washington

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Abstract. Puget Sound has a well-known history of seismic activity. This large deep water (>250 m) estuary is also a prime environment for the generation of tsunami and seiche waves resulting from large-scale movements on the Puget Sound seabed. Evidence for local (5–7 m) and regional (~2–4 m) uplift accompanying an 1100-yr-old event along the Seattle Fault was used to construct a tectonic impulse model representing the type of sudden deformation that may have generated a tsunami in the estuary. The initial impulse model was then used to generate a numerical simulation of the tsunami and to estimate the potential wave heights and wave train periods. Wave amplitudes in excess of 6 m were predicted at Elliott Bay and West Point (Seattle), and Livingston Bay (about 75 km north of the fault zone). Oscillation periods at the two Seattle sites were 3–4 min; wave activity continued for more than one hour. Modeled arrival times of the wave front indicate tsunami velocities as great as 240 km/hr. The results suggest that damage caused by future movement along the Seattle Fault, or on other similar structural trends in the Puget Lowland, would not be confined to areas near the zone of uplift or movement.

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